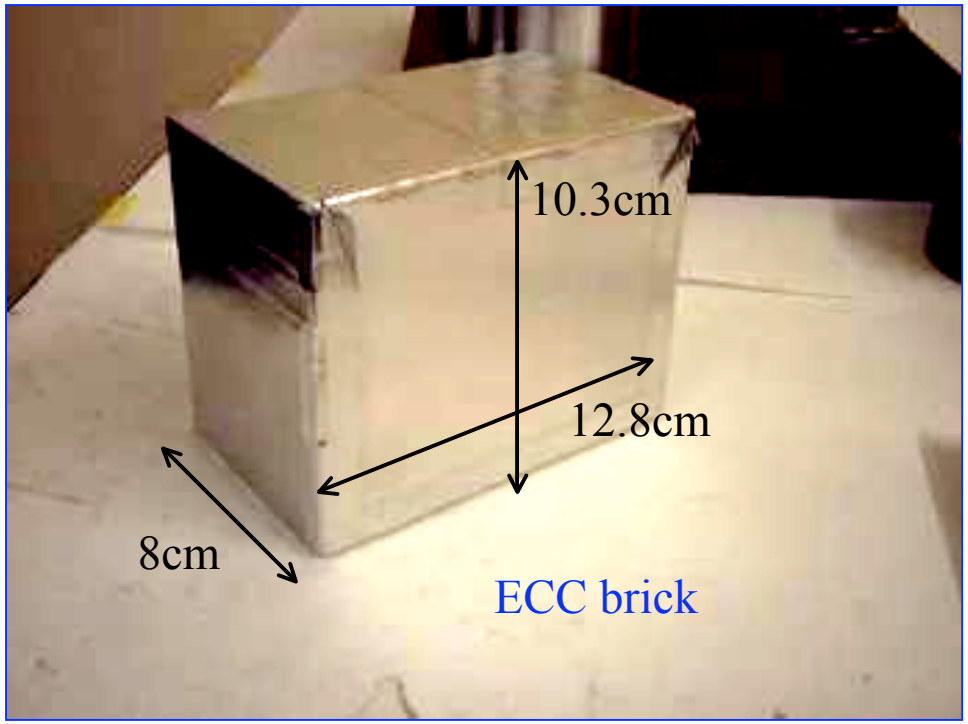
Status of T-952 a.k.a. “PEANUT”

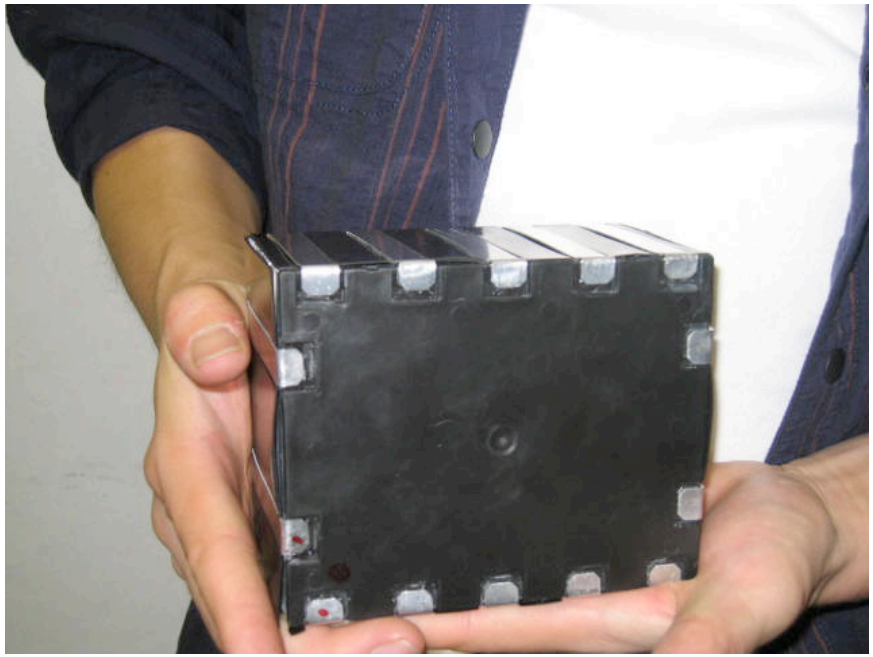
G. Rameika

Oct. 8th 2007

AEM


PEANUT

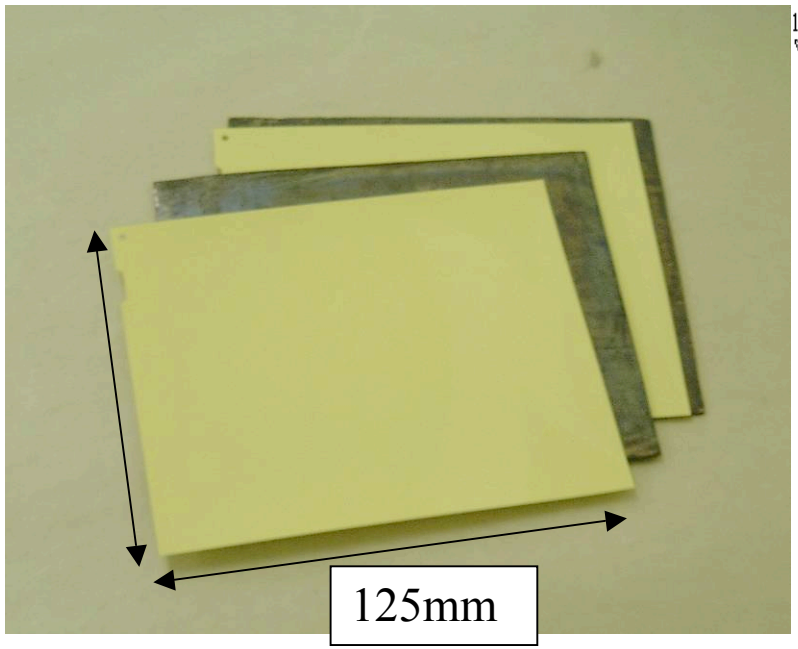

10.3cm
12.8cm
8cm
ECC brick

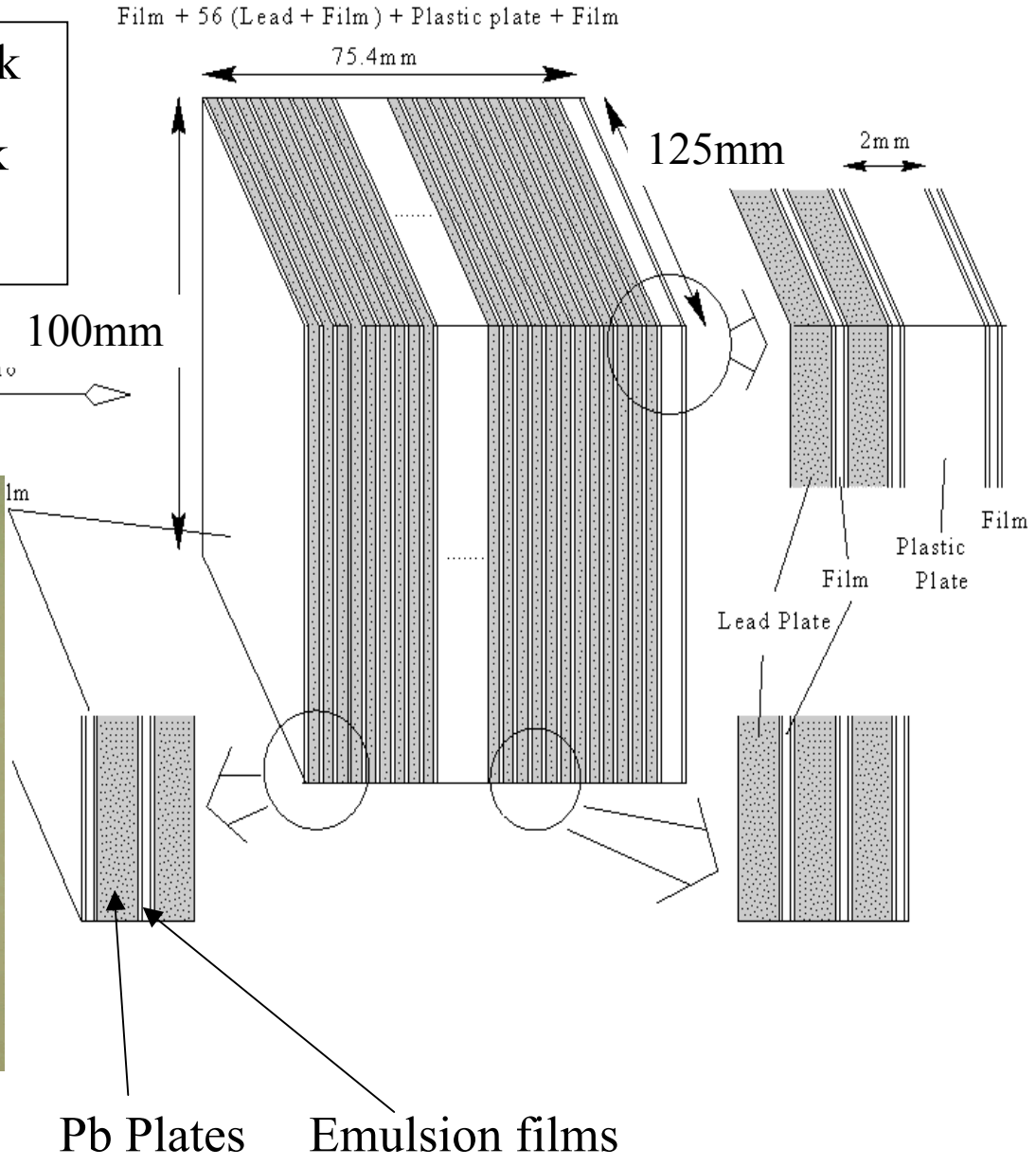


OPERA－ECC

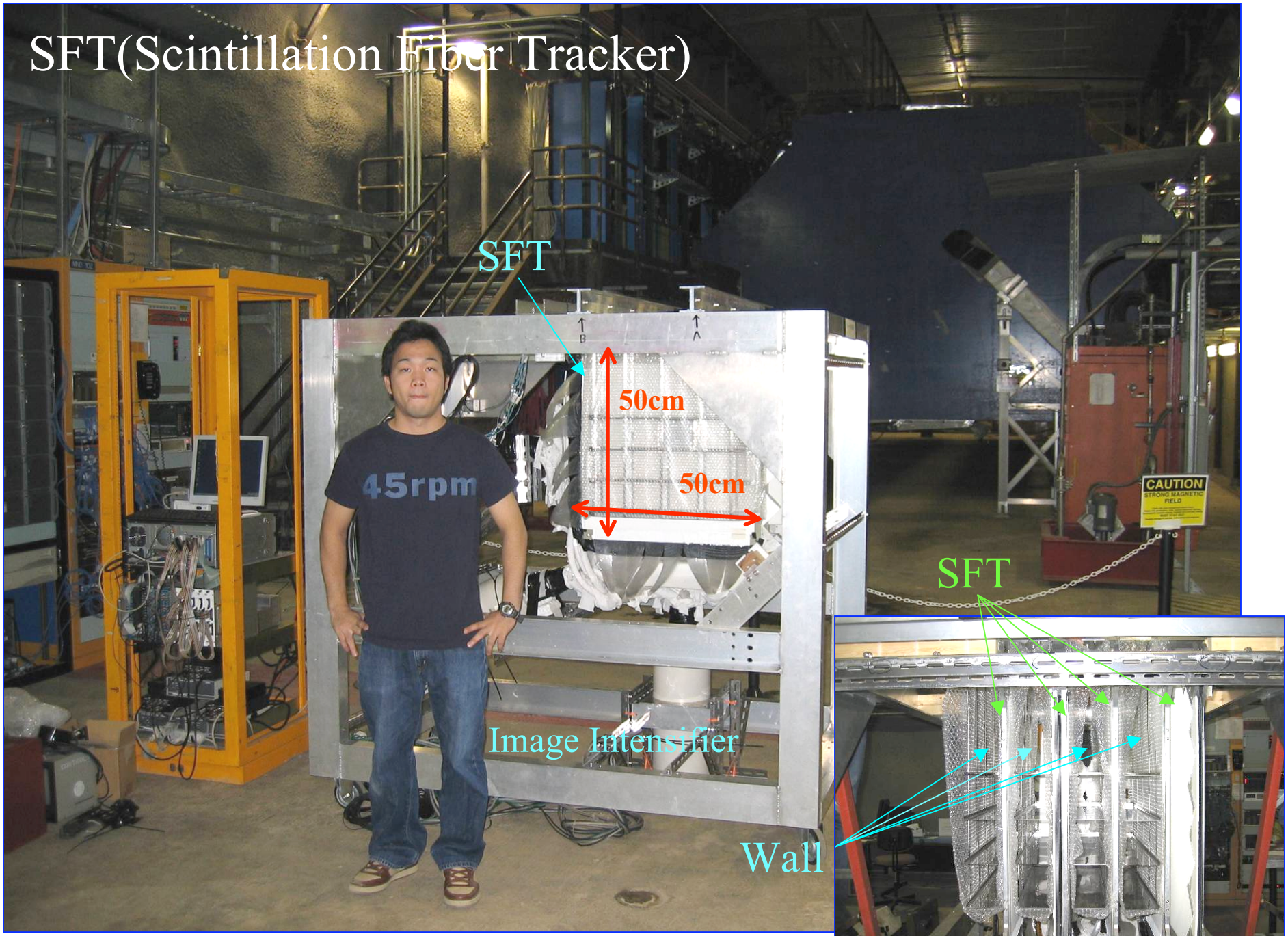
Lead Plates（1mm thick）	56/Brick
Emulsion films	57/Brick
Weight	8.3 kg

Passive target material can be changed. (5.8kg for iron.)





SFT(Scintillation Fiber Tracker)



RUN1: 2005 Aug ~ 2006 Mar

- 160 bricks were exposed.
  - 135 lead type bricks
  - 25 iron type bricks
- 125 bricks were exposed with SFT.
  - 106 lead, 19 iron.
  - 11.2×10^{7}(lead)+2.95×10^{7}(iron) triggers
  - 2.2×10^{21}(lead)+0.54×10^{21}(iron) PoTs
- Expect total events with SFT
  - 1×10^{-18}[event] x(2.2×10^{21}[pot] x 8.3[kg] + 0.54×10^{21}[pot] x 5.8[kg]) = 21392[20K] events
    - Calc from MINOS value: 1×10^{-15}events/PoT/ton

RUN2: 2007 Jun ~ 2008 Jan?

- 36 bricks are in PEANUT detector now.
  - 36 bricks are 0.5mm thin iron type.
  - ~8K events are expected in total.
    - 36 x ~2ev/brick/day x 4month = ~8K
      - Exposure started June 9th
      - Beam off July 17th.
      - Additional exposure will start Oct. 25th through January (Depends on LAr TPC T-962 schedule)

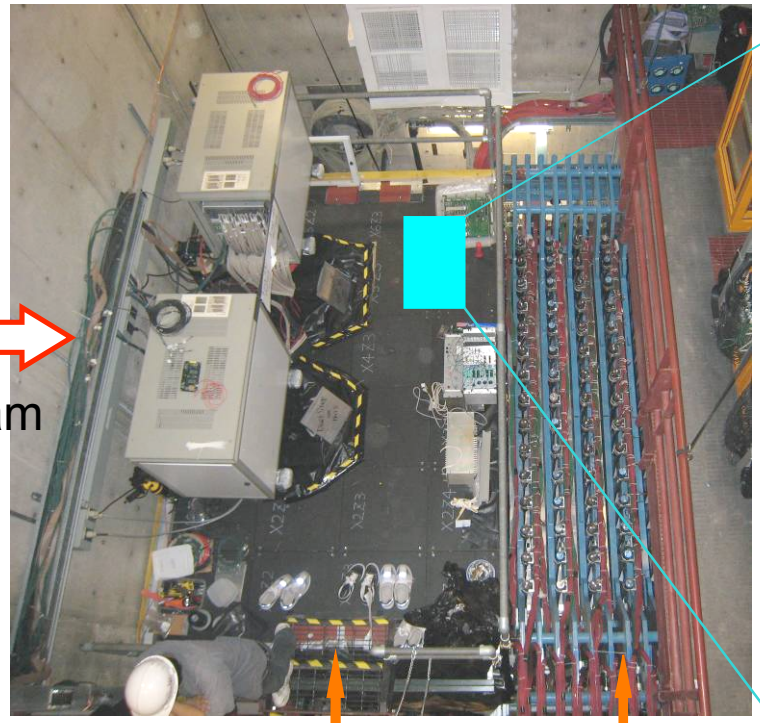
Exposure @ Booster Neutrino

Motivation

Observe low enegy (<1GeV) neutrino interactions in emulsion target.

Installation

We installed ECCs on the bottom of SciBar detector at SciBooNE Site



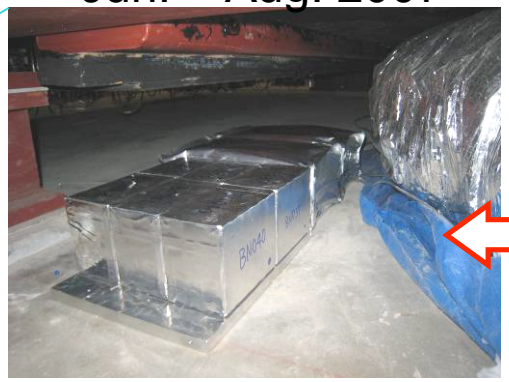
ν Beam

SciBar

MRD

Jun. – Aug. 2007

six type1 ECCs
& two type2 ECCs

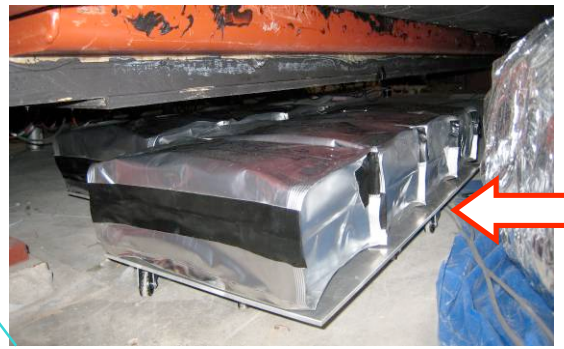


ν Beam
（anti neutrino）

50kg in total

Oct. 2007 – Feb.(Mar.) 2008

two type1 ECCs
& seven type2 ECCs



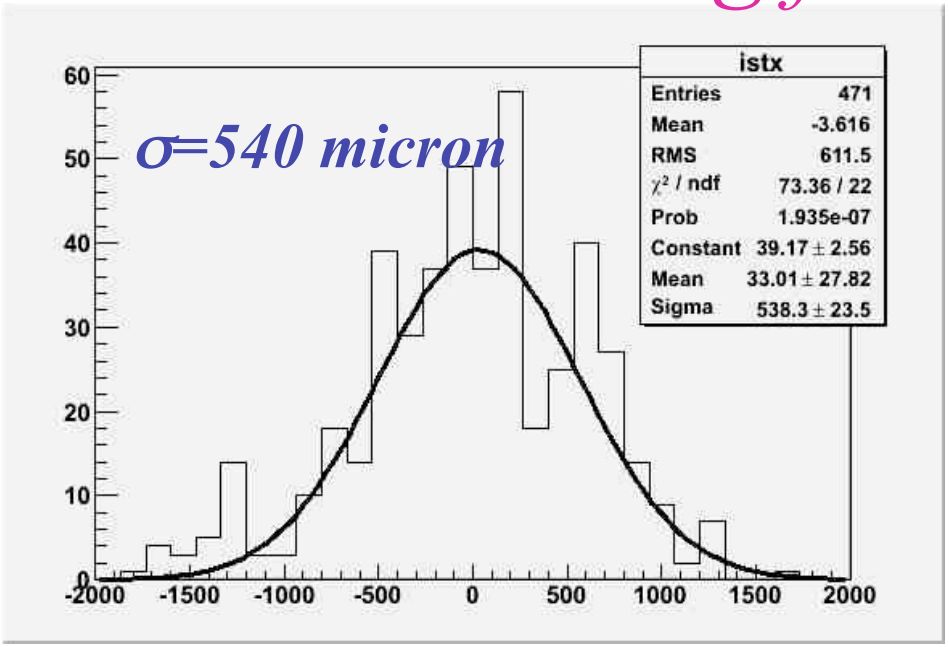
ν Beam
（neutrino）

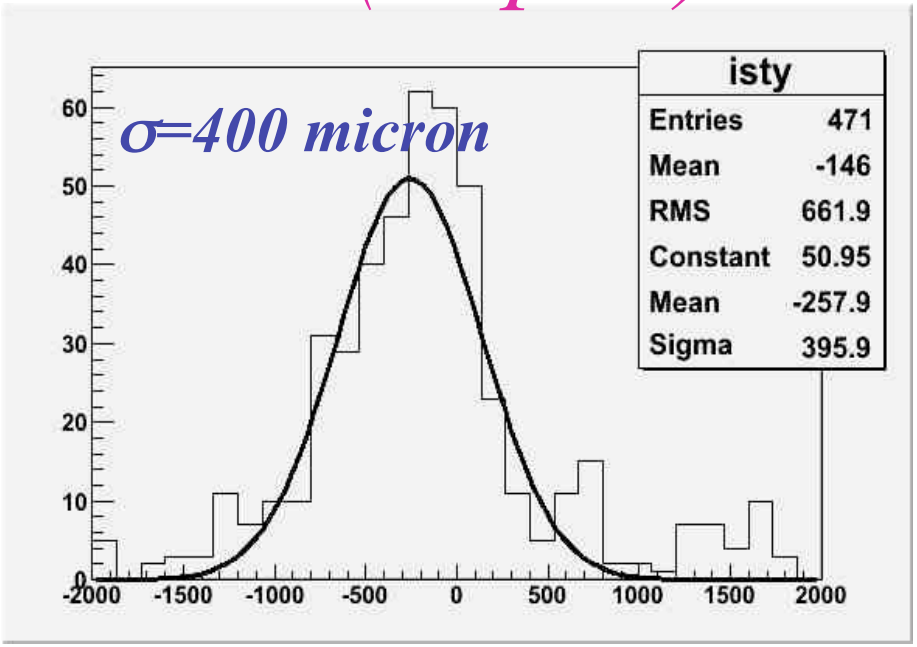
100kg in total

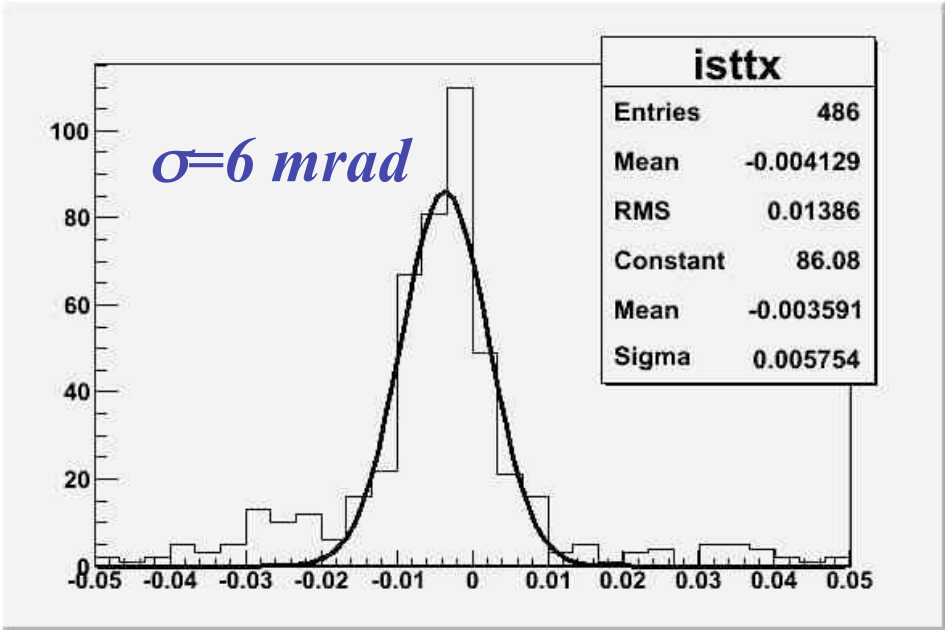
Analysis Strategy

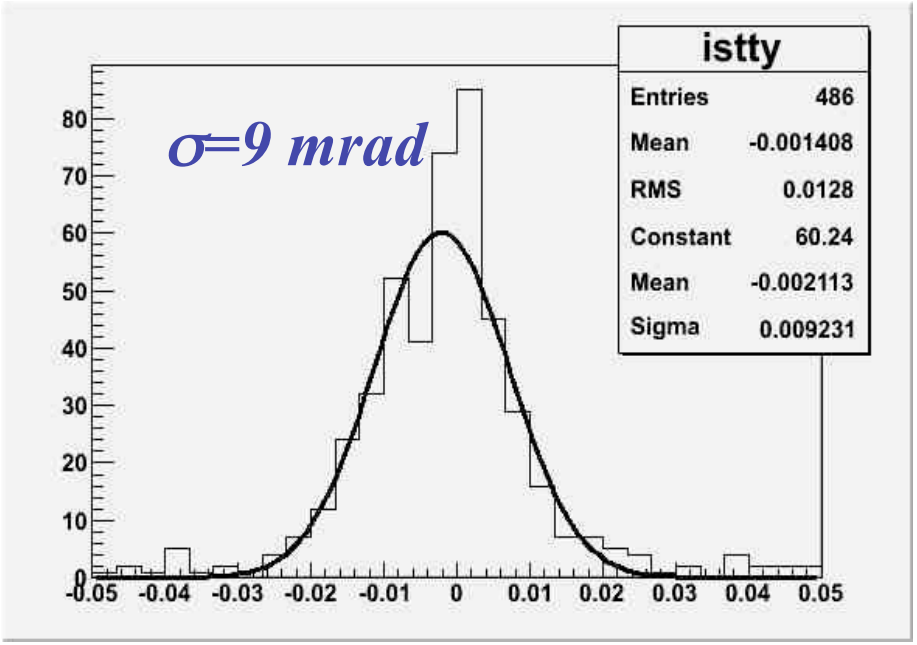
- After exposure, films were developed at FNAL, shipped to collaborating institutions.
  - Approximately a 50-50 split between Japan(Nagoya) and Europe (LNGS, Salerno, Naples, Neuchatel…)
- Interactions are located 2 ways :
  - Using SFT info (ala DONUT)
  - Full area scan
    - OPERA will need a hybrid approach

SFT matching for brick 46 (Naples)

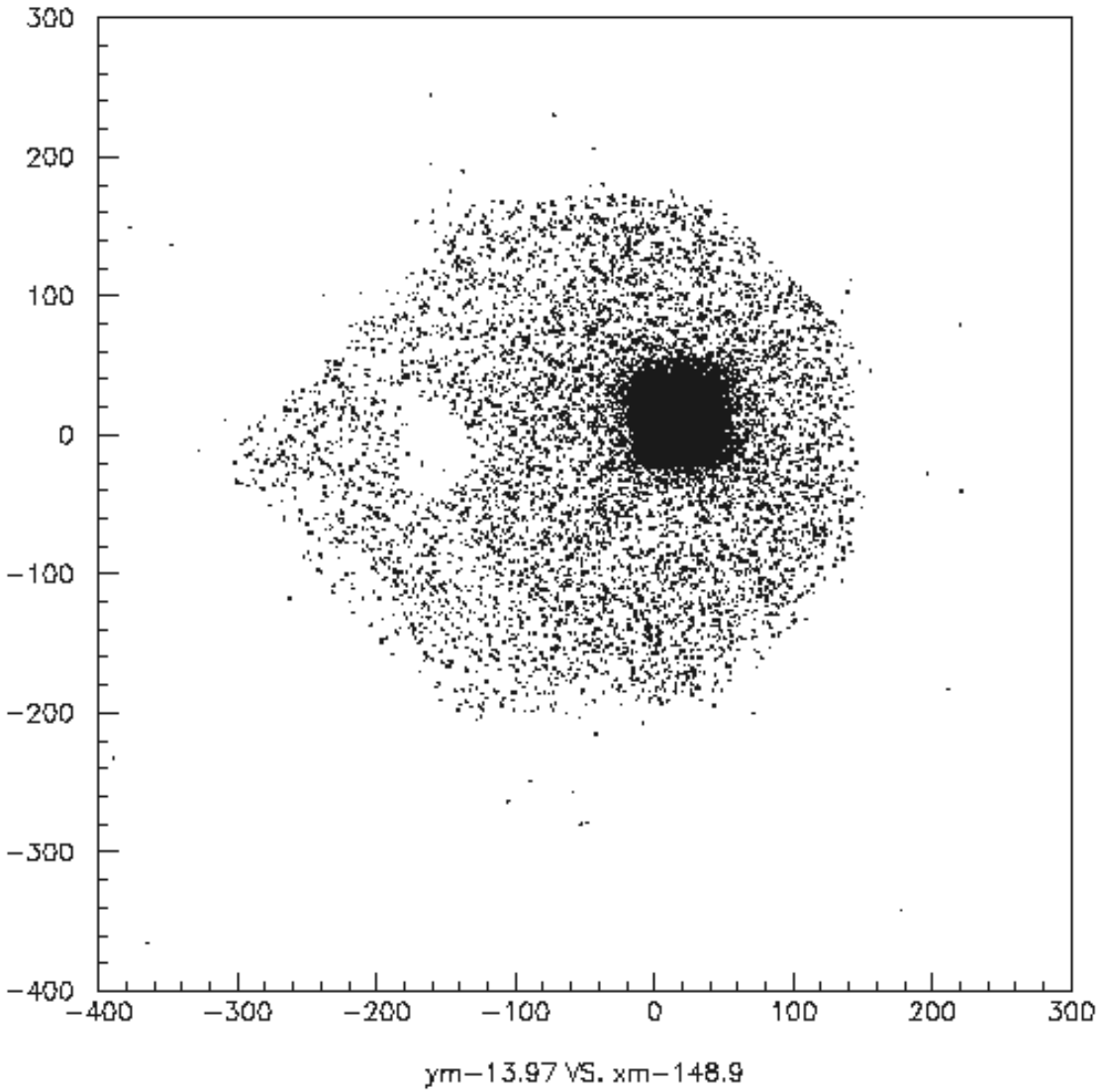






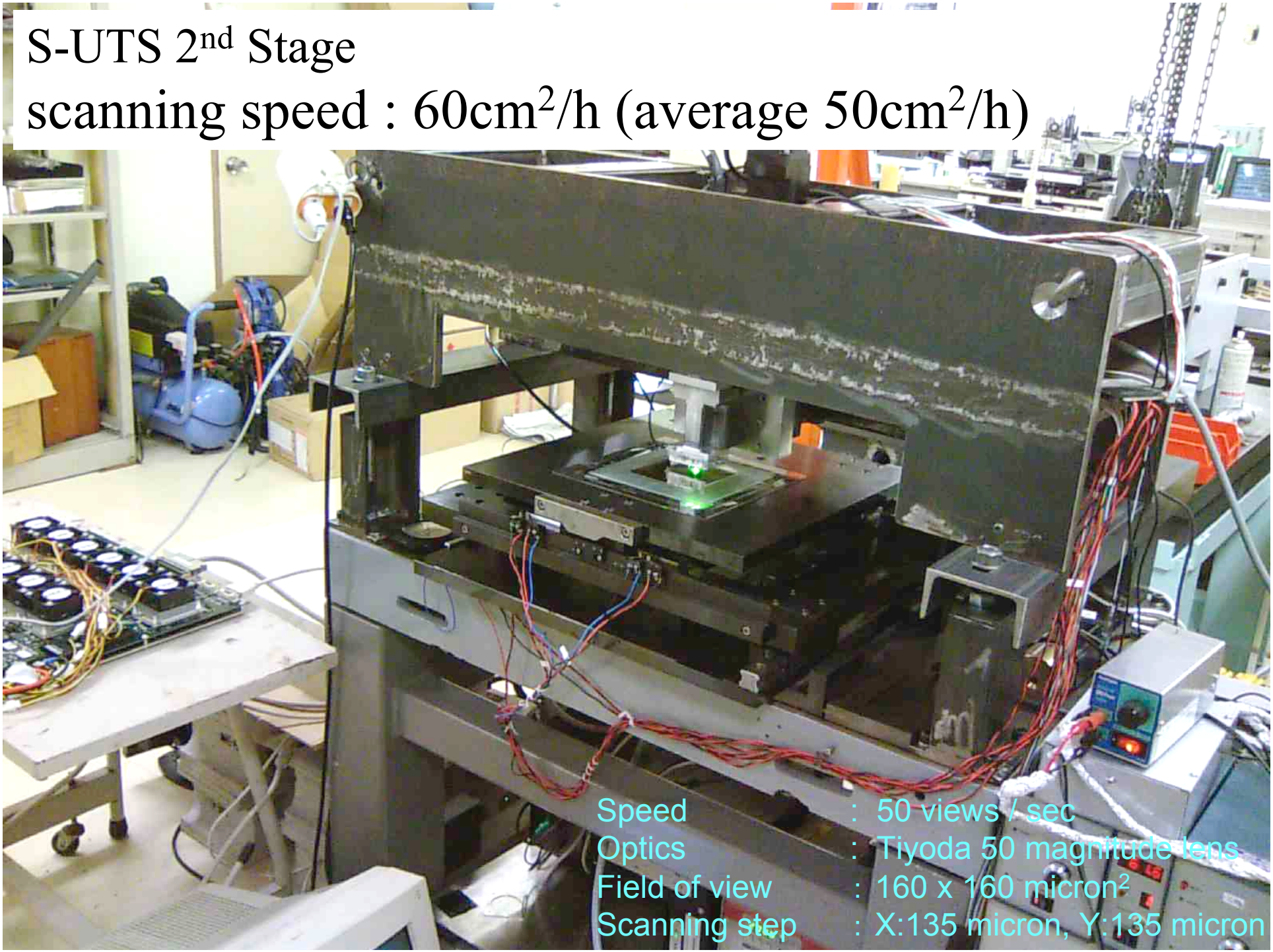


SFT tracks matched to MINOS tracks

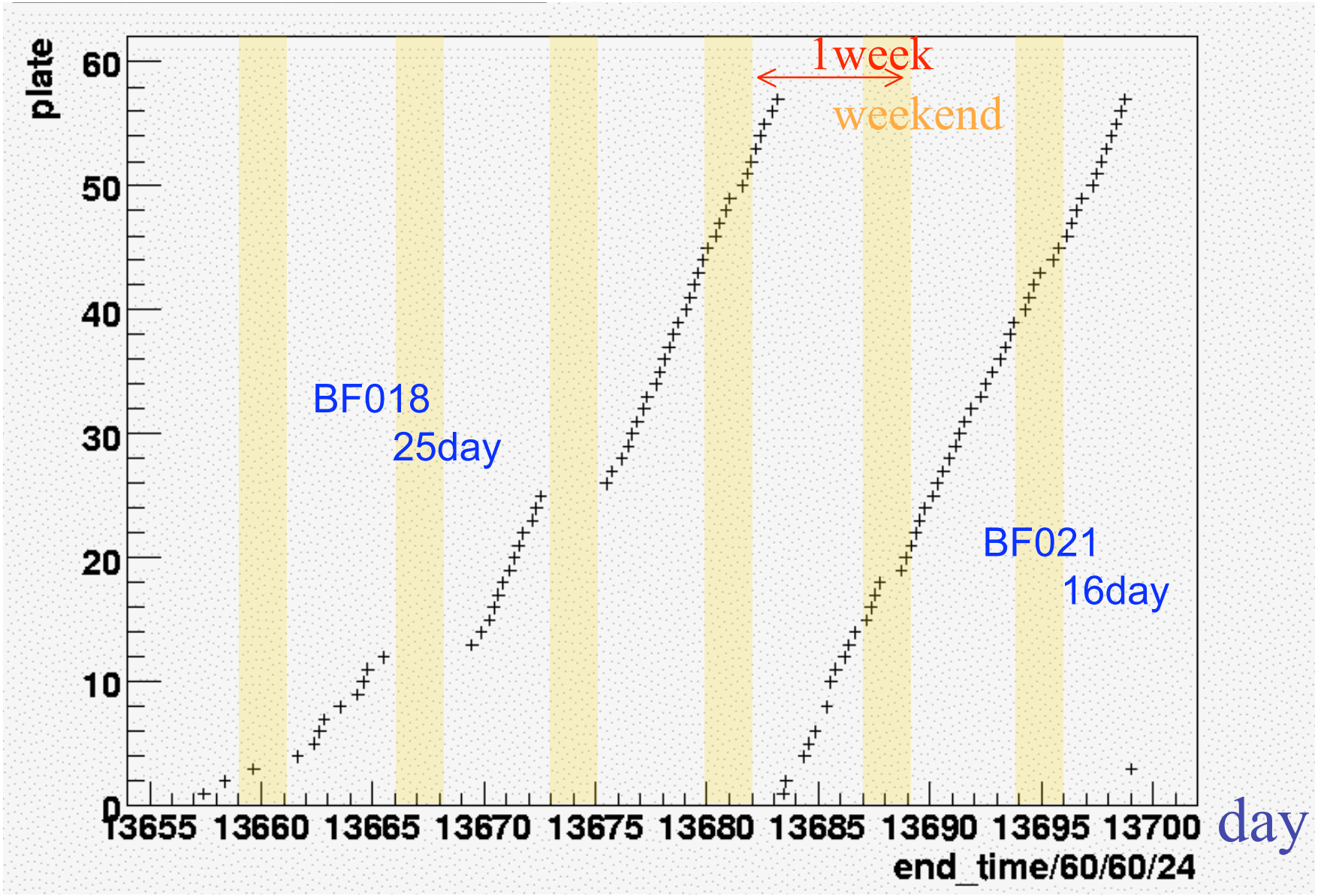


S-UTS 2nd Stage

scanning speed : 60cm^2/h (average 50cm^2/h)

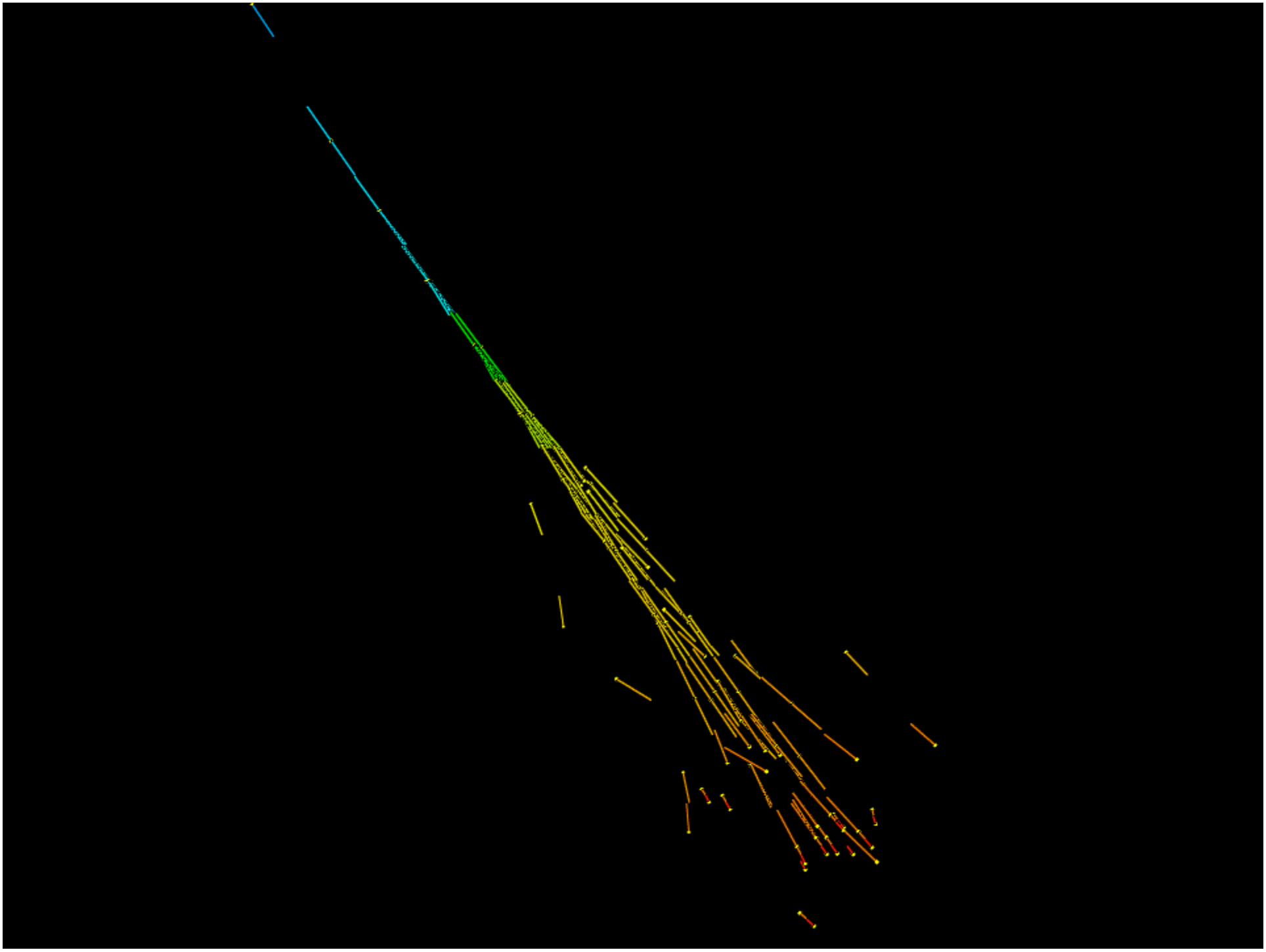


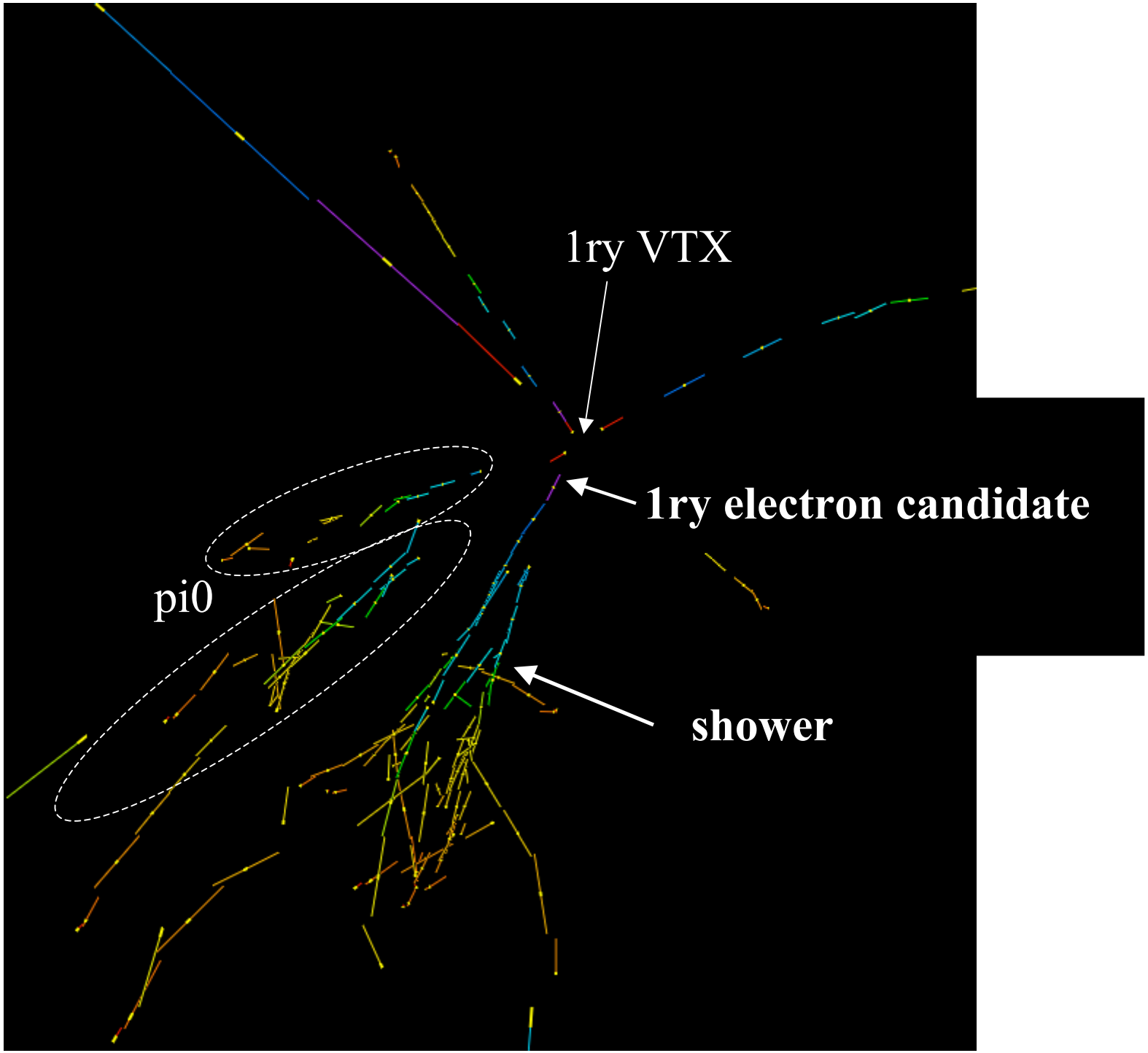
Scanning speed



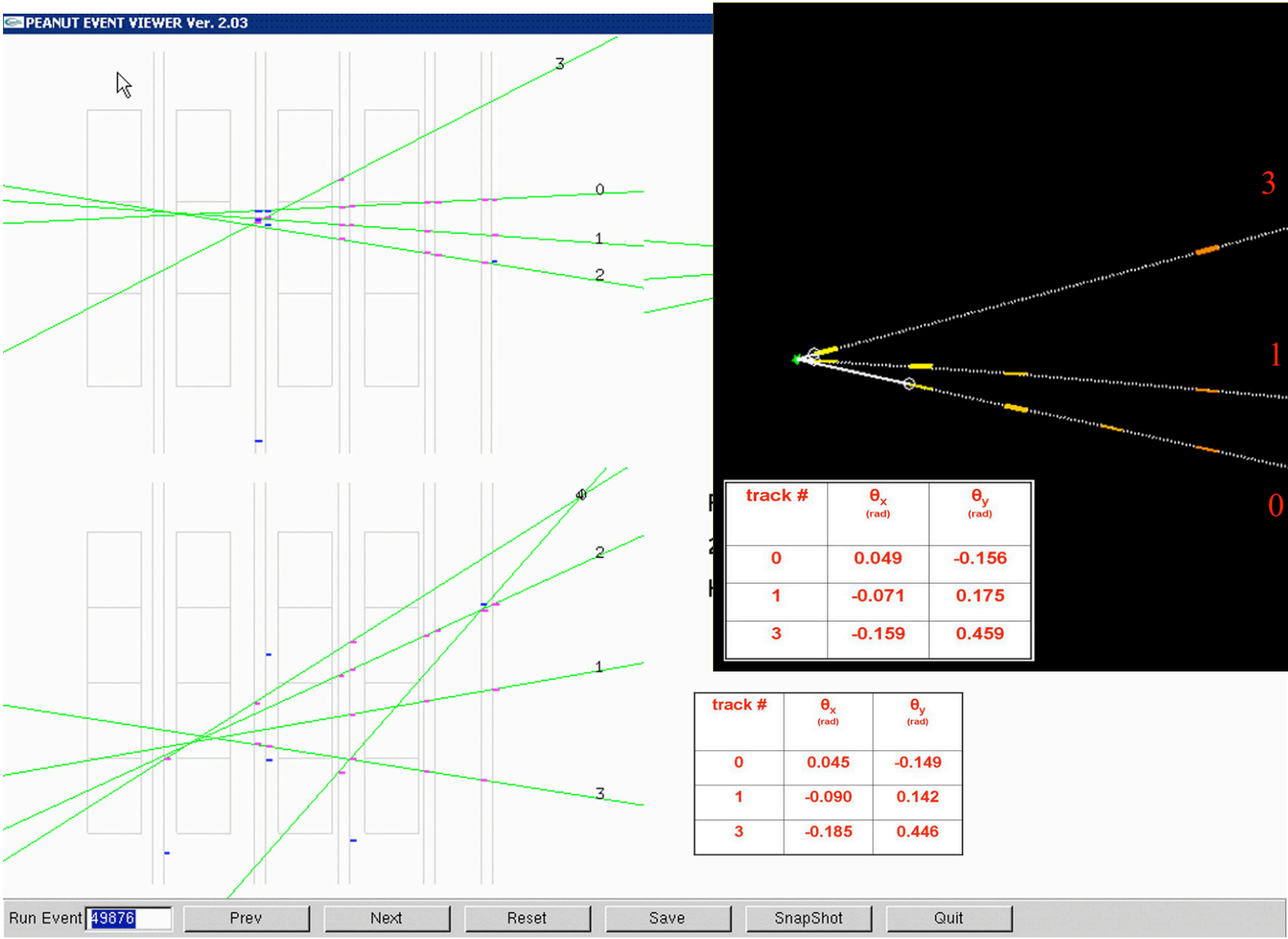
Number of fully scanned bricks @ Nagoya

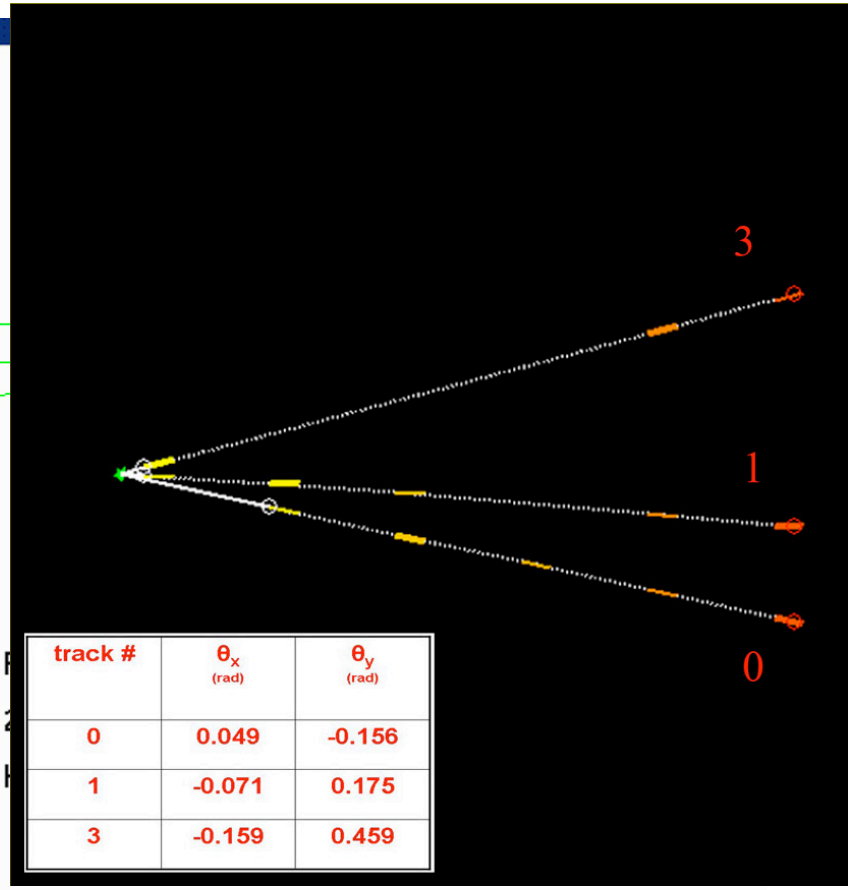
- 4 long term exposure bricks were fully scanned all area; all plates(57)
  - $100cm^2$ x 2 face x 57 plate x 4 brick = $4.56m^2$
- 2 lead type
  - BL118 ($465x10^{17}$PoT)
  - BL112 ($480x10^{17}$PoT)
- 2 iron type
  - BF018 ($358x10^{17}$PoT)
  - BF021 ($358x10^{17}$PoT)
- Expect total ~1K events.




1ry VTX
1ry electron candidate
pi0
shower

3-prong VTX with SFT matching





track #	θ_x (rad)	θ_y (rad)
0	0.049	-0.156
1	-0.071	0.175
3	-0.159	0.459

track #	θ_x (rad)	θ_y (rad)
0	0.045	-0.149
1	-0.090	0.142
3	-0.185	0.446

Total-Scan analysis in Salerno (BL081 and BL082)

Outcome of Scan-back + Manual checks

Brick	Scanback paths	Stops	Stop	Pass	Scatter	Vacuum channel	EdgeOut
BL081	297	45	21	10	5	8	1
BL082	383	82	29	40	0	7	4

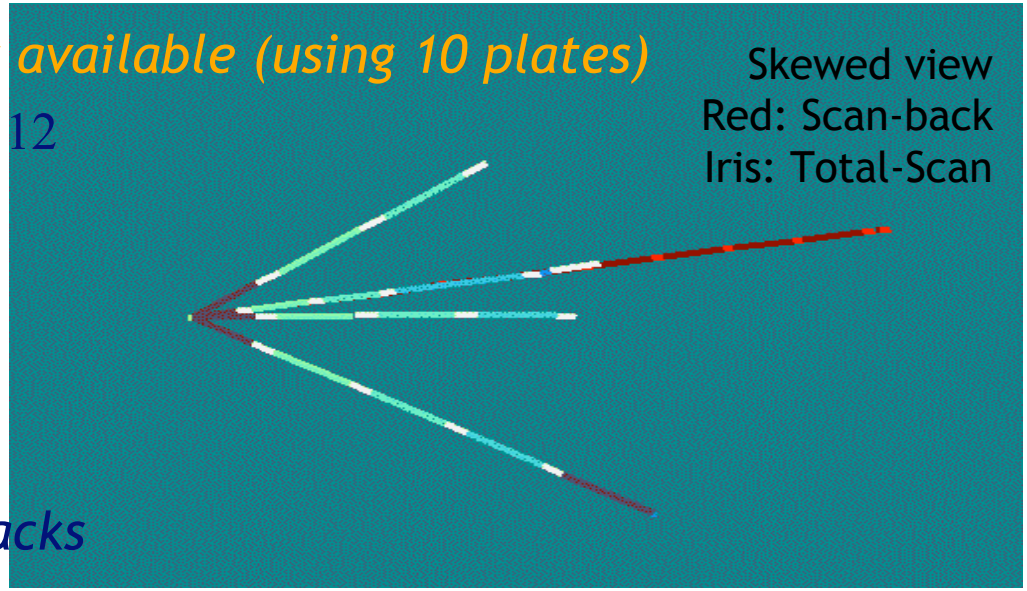
Efficiency problems on many plates

Unbiased Total-Scan to check both Scan-back and Manual checks: data collected around all stopping points in 5×5mm²×(5+5 plates)

5+5 plates = 4+4 plates for reconstruction + 1+1 plates for Virtual erasing

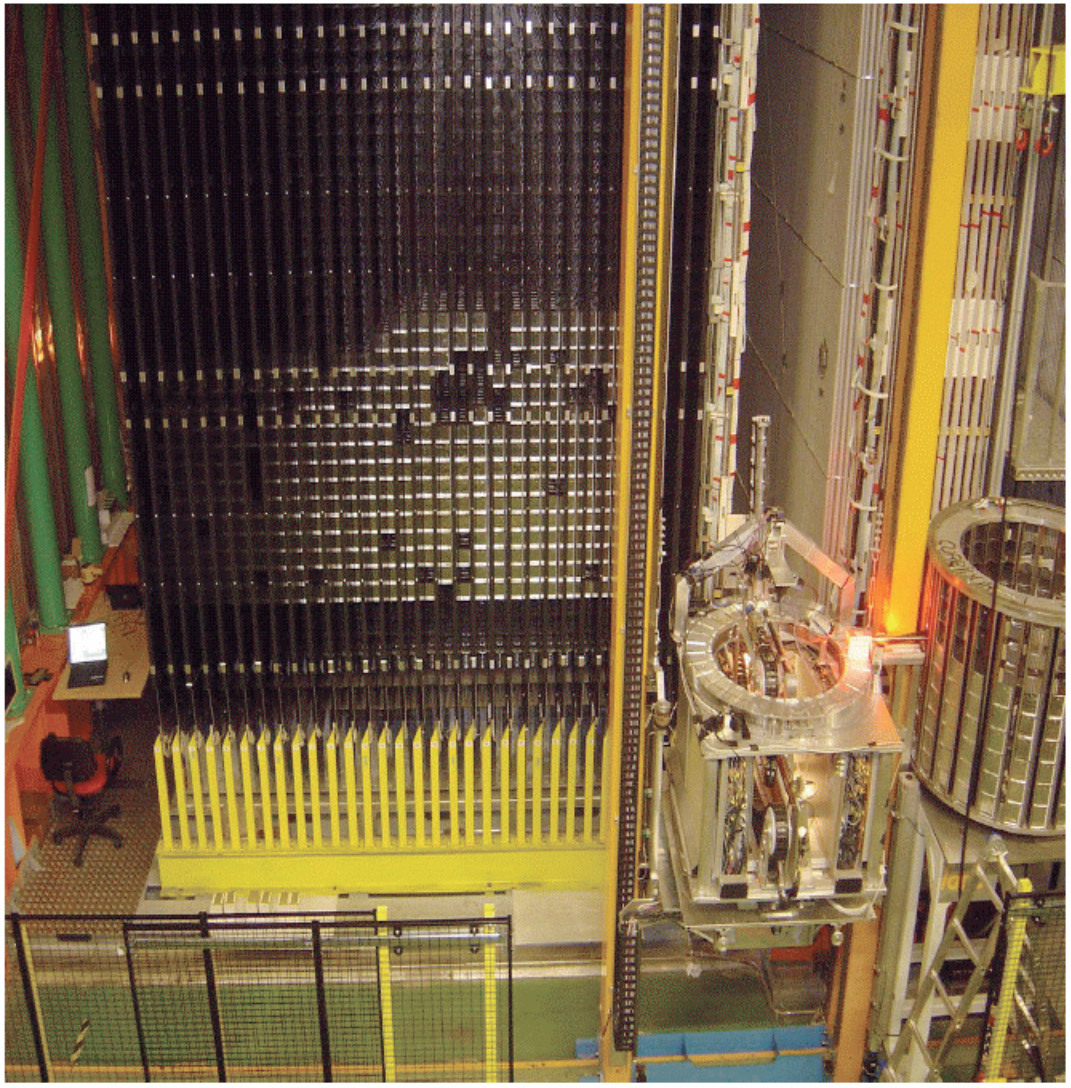
Preliminary reconstructions available (using 10 plates)

Run 47 Event 189037 – stop at plate 12
V4 event in the emulsion
6 SFT tracks reconstructed



No match from non-scan-back tracks

2007 Commissioning: target filling with bricks



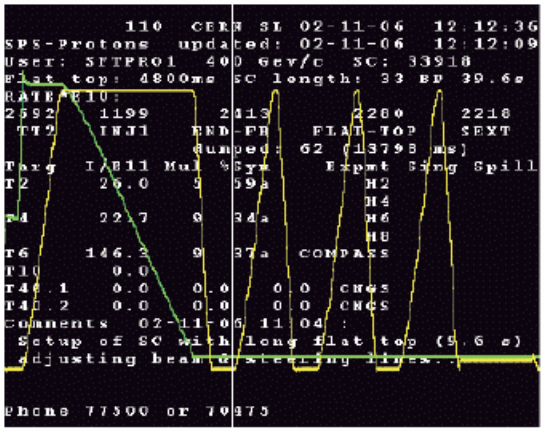
Since Apr '07, BAM produces bricks in stable conditions at a rate of ≅ 11000 brick/m.
Presently about 55.000 bricks are present in the target of SM1.
Completion is scheduled for June '08

35% of full installation

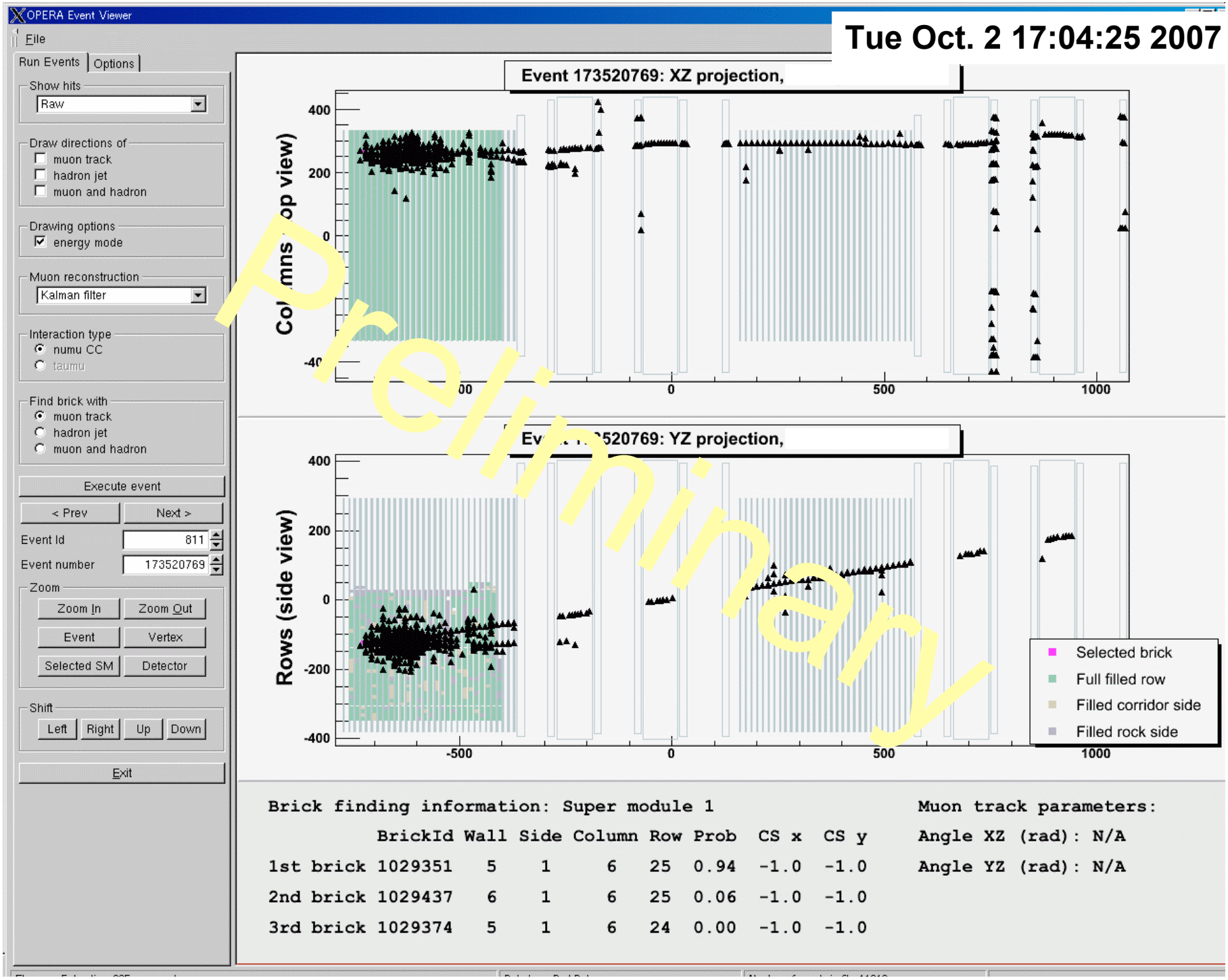
Oct 2007 CNGS run

- 3 weeks of CNGS commissioning run started Sept 17th
- 3 weeks of physics run ~~will start next~~ Friday Oct 5th
- Integrated p.o.t. foreseen ≅ 0.27÷0.37 10^{19} p.o.t.

Target mass	505(37%) → 615(46%) *tons*
Beam intensity	0.27÷0.37 · 10^{19} pot ≈ 6÷8% nominal year ≈ 10 × flux in 2006
Events in bricks	100 ÷ 140
Charm events	6 ÷ 8



Full rehersal for the 2008 full year run


OPERA Event Viewer
File
Run Events
Options
Show hits
Raw
Draw directions of
muon track
hadron jet
muon and hadron
Drawing options
energy mode
Muon reconstruction
Kalman filter
Interaction type
numu CC
taumu
Find brick with
muon track
hadron jet
muon and hadron
Execute event
< Prev
Next >
Event Id
811
Event number
173520769
Zoom
Zoom In
Zoom Out
Event
Vertex
Selected SM
Detector
Shift
Left
Right
Up
Down
Exit
Tue Oct. 2 17:04:25 2007
Event 173520769: XZ projection,
Event 173520769: YZ projection,
Rows (side view)
Selected brick
Full filled row
Filled corridor side
Filled rock side
Preliminary
Brick finding information: Super module 1
BrickId Wall Side Column Row Prob CS x CS y
1st brick 1029351 5 1 6 25 0.94 -1.0 -1.0
2nd brick 1029437 6 1 6 25 0.06 -1.0 -1.0
3rd brick 1029374 5 1 6 24 0.00 -1.0 -1.0
Muon track parameters:
Angle XZ (rad): N/A
Angle YZ (rad): N/A